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ADVANCES IN NAVAL STORES RESEARCH

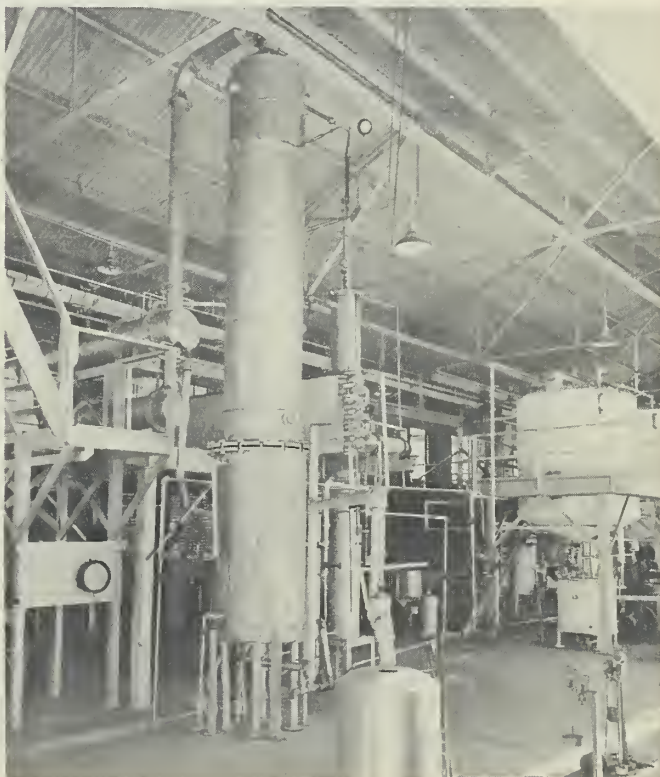
USDA research underlies the success of a \$30-million-a-year gum turpentine industry that provides income for more than 400,000 southern farmers.

In the past 20 years, chemists and engineers at USDA's Naval Stores Station, Olustee, Fla., have developed turpentine and rosin production methods--principally gum cleaning and steam distillation--that today are widely used by pine gum processors.

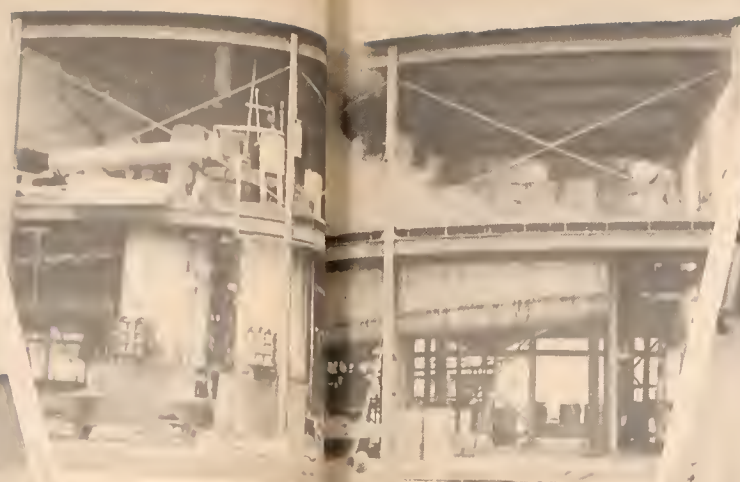


Source of an industry. Bark is chipped from the trunk of a southern pine tree and the exposed surface sprayed with sulfuric acid to stimulate flow of sap (or pine gum). N-14821.

Continuous distillation column at Naval Stores Station, Olustee, Fla., should eventually replace the batch still now in wide use by commercial gum processors. This development has been commercialized by the naval stores industry. Its savings in steam requirements should prove revolutionary in turpentine distillation. N-14820.

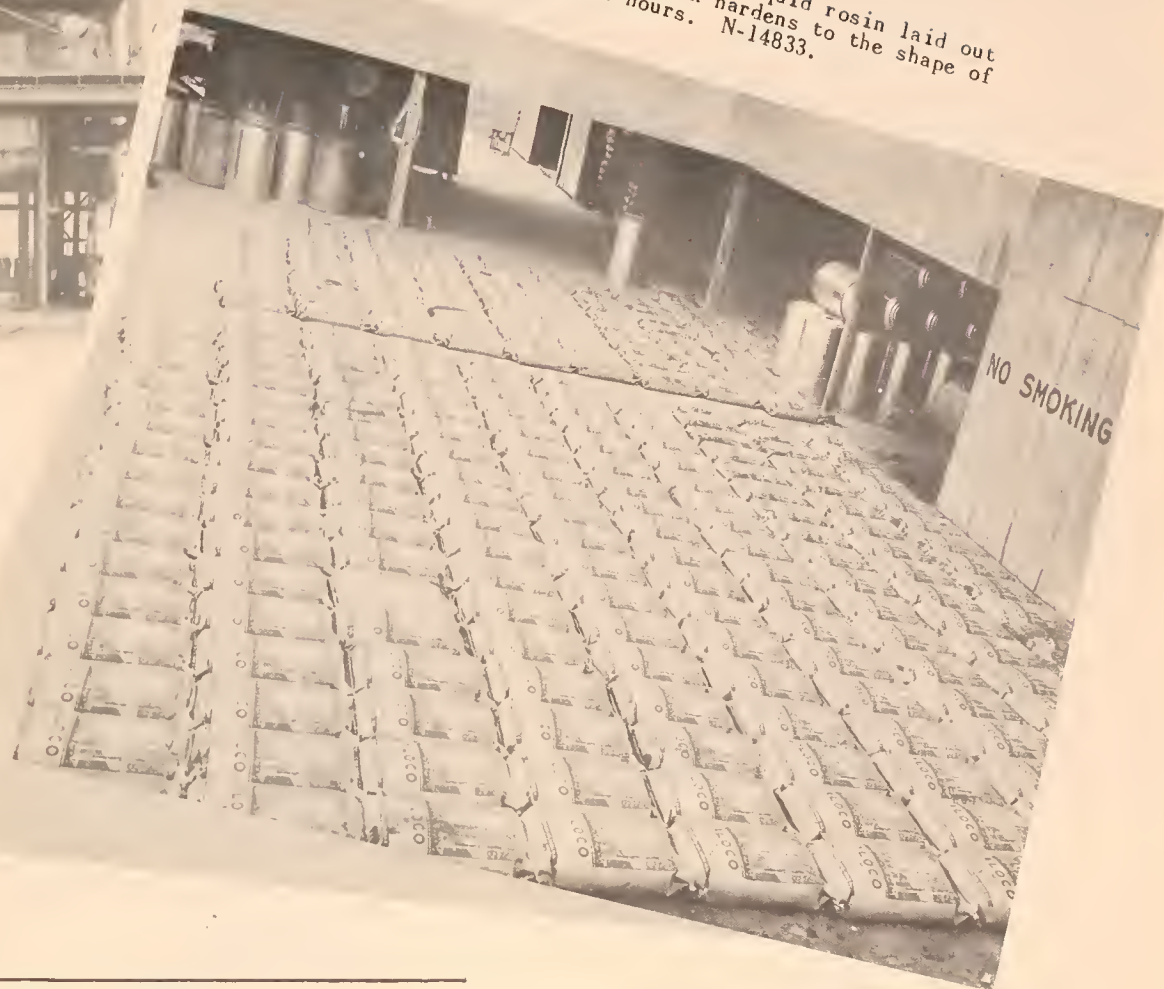


Typical pine gum processing plant at Lake City, Fla., where the Olustee system of gum cleaning and the steam distillation process is now in use. Trucks bring in barrels of crude gum from surrounding pine forests. N-14829.



Side view of processing plant shows: canted charge of raw gum is poured and, beneath it, from which gum is carried by steam melters (two white tanks on lower level washed with water in large tanks in photo) prior to distillation.

100-pound bags of hot liquid rosin laid out to be air-cooled. Rosin hardens to the shape of the bag within 24 hours. N-14833.



A new continuous turpentine still that requires only 50 percent as much steam as a batch still has been developed at the Naval Stores Station and adopted by industry.

These scientists of the Department's Agricultural Research Service have also found many new uses for pine gum products.

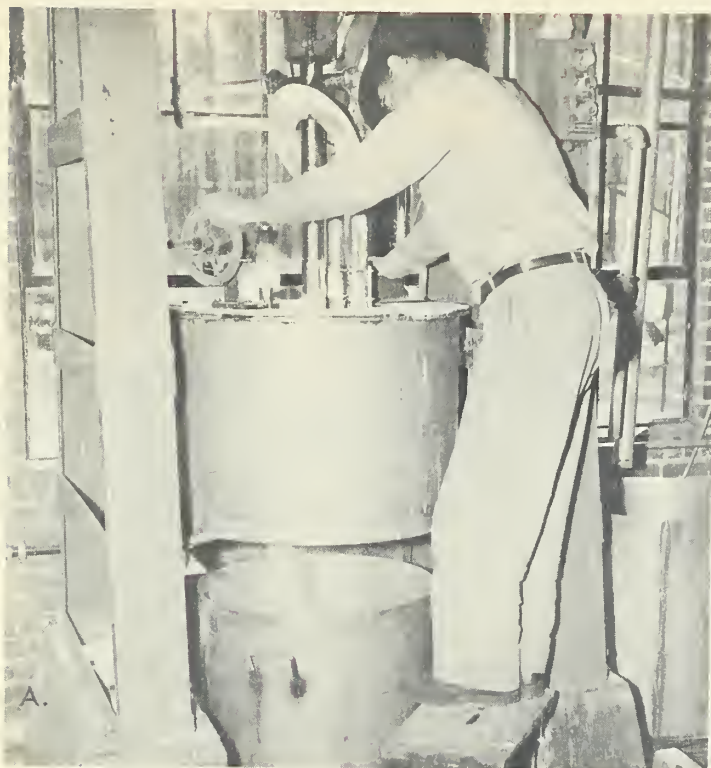
From crude gum they have produced maleo-pimaric acid, a white powder that has industrial application in printers' ink, paper sizing, alkyd resins, and photographic chemicals.

They have prepared from components of turpentine many important esters, including several of the esters of pinic acid. These have been evaluated and found to be excellent as lubricants for engines of jet aircraft and as plasticizers--or fillers--for plastics. Another turpentine derivative, pinane

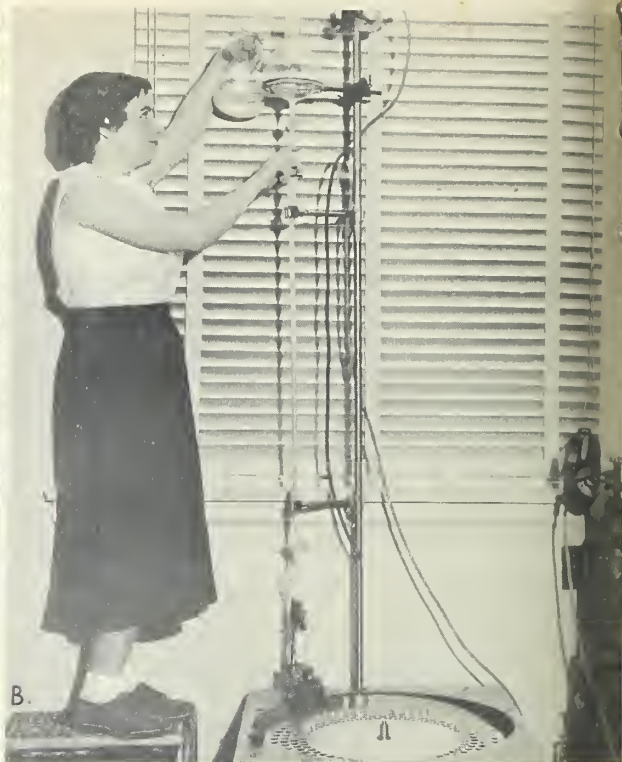
hydroperoxide, is used as a catalyst in the production of cold rubber.

Addition of metals such as lead and magnesium to aldehyde-modified rosin resulted in improved metal resins that are valuable as paint driers. Chemists at the Olustee Station are currently looking deeper into rosin for commercially important products. So far, they have identified one acid--palustric acid--not heretofore known, and they are on the trail of several others. New information on the properties of palustric acid has already proved valuable in the preparation of paper sizing.

Since the Naval Stores Station was established in 1933, its staff has acquired more than 60 public service patents for research-developed products and processes.



A. A fresh turpentine and crude gum mixture treated with maleic anhydride results in maleo-pimaric acid--the white powder sifting from bottom of the centrifuge. This pine gum product, which is now an excellent material for use in printer's ink, paper sizes, and photographic chemicals, was first produced on a pilot plant scale with this equipment at the Naval Stores Station. N-14822.



B. Rosin acids, with potential industrial futures, can be separated from a solution of pure rosin by partition chromatography. Emily Baldwin, Naval Stores Station chemist, pours solvent into column containing rosin absorbed on silica gel, which separates out acids as they filter down column at various speeds. They are metered, a drop at a time, into the tubes on revolving turntable. N-14825.



C. Each of the rosin acid fractions collected in the tubes is titrated against a known standard to determine amount of acid in each sample. N-14826.

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